

High-tech greenhouses and hydroponic tomatoes



Florian Gostner



Daniela Gostner

Q&A with Florian Gostner and Daniela Gostner

Florian Gostner is CEO of Fri-EI Green House, a subsidiary of Fri-EI Group, one of Italy's main producers of renewable energy. Florian was previously CEO of Fri-EI Biogas Holding before creating Green House, a 100% innovative business.

Daniela Gostner is CFO of Fri-EI Green House.

Fri-EI Green House grows hydroponic tomatoes under the brand name H2Orto using heat energy that is a byproduct of the Fri-EI Group biogas plants. The company produces 20,000 tons of vine, cocktail, and cherry tomatoes a year, and serves the major Italian supermarket chains.

Fri-EI Group is a producer of energy from renewable sources. That in itself is a sustainable and innovative goal. On top of that, a branch of the Gostner family now supports high-tech greenhouses. Can you tell us more about the background of the Green House project and the inspiration behind this innovation?

The Gostner family were pioneers in renewable energy, founding the precursor to Fri-EI in 1994. So we really know the renewable business inside and out. The Fri-EI Green House business was started by the second generation of our family in 2016. At that time Fri-EI was operating more than 22 biogas plants, each producing 999 kW of energy. The idea was to recuperate the wasted heat energy from these biogas plants. Our original plan was to build a

greenhouse of one or one-and-a-half hectares next to each biogas plant, but ultimately we decided to make one large investment in the Ostellato location. We saw the huge potential of the site as it offers extensive gas lines, high voltage power lines, a lot of space for future expansion, and geothermal heat to run the greenhouse with 100% renewable energy.

In just a few years Fri-EI Green House has become an important producer of greenhouse tomatoes, grown with a hydroponic system that has minimal environmental impact, without polluting the ground or groundwater. Moreover, using hot water, which is a byproduct of the biogas plant, and thanks to the LED lighting system, the company is able to produce tomatoes throughout the year.

What are some of the innovations you've incorporated into operations at the Fri-El greenhouses?

The main innovation we've incorporated in the project was the use of 100% artificial light using LED technology. The technology was the result of a research project we performed together with the University of Bologna to develop a lamp which was ideal in terms of efficiency and light frequency in our climate circumstances. We now have 220 km of these LED lights running through our greenhouses, which is key especially in the winter months.

We also have a high-efficiency co-generation with a CO2 recovery system, which purifies the exhaust gas to introduce it into the production cycle of the plants, stimulating their growth.

Furthermore, we have a control system that controls the climate in the greenhouse and monitors plant growth. Finally we have a highly automated warehouse with a tracking system to reconstruct the path of each harvested fruit back to seedling.

Can "high-tech" and "ecological" go hand-in-hand?

In our case "high tech" features are used to improve "ecological" aspects. To list just some examples:

- We use a system to recover and store rainwater that allows us to use 30% less water than traditional cultivation.
- We reuse drain water from the plants after purifying the water with UV technology, which permits a further reduction of 30% in water use compared to conventional growing.
- Our latest-generation LED technology reduces energy consumption by more than 60% compared to traditional sodium lamps.
- In the near future we will use 100% geothermal power instead of gas for heating and lighting the greenhouse.

Are new processes and procedures something you look at in your business regularly?

We constantly improve processes and procedures, especially in the post-harvest phase to improve labor



efficiency. Specifically we have implemented automatic loading and unloading of harvesting trolleys as well as automatic feeding of packing lines and custom storage-management software to optimize internal logistics and monitor packing productivity.

In 2019, you received the Responsible Innovators award of the Emilia-Romagna region. Does your future strategy include new research and ways of optimization of the current concept? And if so, are you thinking about the responsible side, or the innovation side, or both?

Our future strategy includes, of course, ways to optimize the current concept. The biggest challenge is the optimization of energy use, or rather, the use of renewable energy to produce electricity for the lamps and heating in an economically and ecologically sustainable way. The



outcome of this is the reduction of CO2 emissions. Our goal is to transform the company into a completely carbon-neutral entity in terms of energy production by 2025.

Has the pandemic pushed a new way of thinking at your business?

Yes, the pandemic impelled us to find a more sustainable solution regarding energy resources. Furthermore, the recent increase in energy prices to a level that is no longer sustainable for companies has made the search for energy solutions more urgent than ever.

How do you see the future of circular economy? Any major changes to be expected in the next two to four years?

The reuse of material in general will become more and more important and the circular economy will become

fundamental to make businesses profitable. Every year we try to find new solutions to reduce the waste of materials and to push towards ecological and reusable material to lower the environmental impact of our production.

In our case, this has meant using recyclable packaging, using beneficial insects, avoiding waste of water by recovering rainwater, and finding a solution to reuse or compost the plants at the end of the production cycle.

What can you tell us about the financials of Fri-El Green House? Is it possible to have a profitable business using this model or must the incentives be other than economic?

In the long term, the implementation of proven technologies that increase production capacity and reduce environmental impact will be profitable even without subsidies. Obviously, the research and development of these technologies have significant investment costs that are not always paid back immediately and for this reason the companies should be encouraged by public administrations.

In the specific case of hydroponics, to be profitable without incentives it is necessary to optimize the level of technology, agronomic know-how, and commercial capabilities. We were able to draw on technological expertise from Fri-El's 25 years of renewable energy experience.

We also gained some hydroponic knowledge from advisors from the Netherlands, but the climate in our region is very different to the Dutch climate. Many important aspects were basically experimentation and learning by doing.

To reach the commercial goals we invested in personnel to create a solid sales network.

I think the model can be adopted more widely in Italy. The Netherlands has thousands of hectares and a huge amount of exports. In Italy we have better conditions in terms of climate, labor, and market conditions. A possible challenge is the complexity of this business, since it is capital, labor, and technology intensive.

Emilia-Romagna is famous for its gastronomy. What has been the feedback from foodies on H2Orto tomatoes?

Our clients appreciate the taste first and foremost, and then our sustainable production methods. Other additional values of our vegetables are the nickel-free certification and food safety since we work in a controlled environment and apply strict hygiene protocols and integrated pest management. Therefore, our products are appreciated not only in the high-gastronomy arena, but also in high-volume supermarkets. The path for the future is for sustainably produced food to be served on every table. ■



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